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Review

Burn-related peripheral neuropathy: A systematic review

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ABSTRACT

Peripheral neuropathy is the most frequent disabling neuromuscular complication of burns. However, the insidious and progressive onset of burn neuropathy makes it often undiagnosed or overlooked. In our study, we reviewed the current studies on the burn-related peripheral neuropathy to summarize the morbidity, mechanism, detecting method and management of peripheral neuropathy in burn patients. Of the 1533 burn patients included in our study, 98 cases (6.39%) were presented with peripheral neuropathy. Thermal and electrical burns were the most common etiologies. Surgical procedures, especially nerve decompression, showed good effect on functional recovery of both acute and delayed peripheral neuropathy in burn patients. It is noteworthy that, for early detection and prevention of peripheral neuropathy, electrodiagnostic examinations should be performed on burn patients independent of symptoms. Still, the underlying mechanisms of burn-related peripheral neuropathy remain to be clarified.

Contents

1. Introduction . . . 00
2. Material and methods . . . 00
3. Results . . . 00
4. Discussion . . . 00
   4.1. Mechanisms of peripheral neuropathy in burn . . . 00
   4.2. Detection of peripheral neuropathy in burn . . . 00
   4.3. Acute management of peripheral neuropathy . . . 00
   4.4. Delayed peripheral neuropathy . . . 00
   4.5. Future research . . . 00

Abbreviations: EMG, electromyography; MNCV, motor nerve conduction velocity; CMAP, compound muscle action potential; CRPS, complex regional pain syndrome.

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References 00

1. Introduction

Peripheral neuropathy is the most frequent disabling neuromuscular complication of burns. Factors such as thermal, electrical, and chemical injury, as well as secondary scar formation can lead to peripheral nerve lesions. Neurological symptoms of patients with burn vary from neuropathy to reflex sympathetic dystrophy [1–4].

The insidious and progressive onset of burn neuropathy makes it often undiagnosed or overlooked [5]. Helm et al. reported a 29% incidence of peripheral neuropathy in 66 burn patients [6], while 5% (18/370) prevalence was reported by Gabriel et al. [7]. Different methodologies in these studies brought about the varied incidence of peripheral neuropathy in burn patients.

Few studies with high level evidence discuss burn-related peripheral neuropathy. Although there is a lack of randomized trials of different treatments for burn-related peripheral neuropathy, we conducted a systematic review of the current studies on the burn-related peripheral neuropathy, to attempt to summarize current information, to outline current practice, and to discuss recommendations for future studies.

2. Material and methods

Medline, Cochrane, and Embase databases were systematically searched using the terms “peripheral nerve”, “peripheral nerve injury”, “peripheral nerve injuries”, “peripheral neuropathy”, “burn” and “burns”.

The criteria for eligibility for selection of a paper were: English language, clinical study, and detailed data, including the etiology and the outcome. Case reports and articles without outcomes of the involved peripheral nerves were excluded. Inclusion criteria were established before data collection. The full text was then obtained for further analysis if the article was eligible for inclusion.

3. Results

After removing duplicate articles, 1017 articles were identified through the primary combined search of Medline, Embase and Cochrane databases. Additional 3 articles were identified by reviewing the reference lists of retrieved articles. 420 articles were excluded from the total 1020 articles because 178 of them were non-English and 242 of them were non-human. Further, 581 articles without outcomes and 12 case reports were excluded from the remaining 600 articles. Therefore, only 7 articles were finally included in this systematic review (Fig. 1).

Of the 7 articles selected, most were retrospective case series using historical series as control (Oxford level of evidence “4”). A total of 98 burned patients were presented with peripheral neuropathy, a 6.39% (98/1533) proportion of the burned patients studied. Thermal and electrical burns were the most common etiologies. In the upper extremity, the most commonly involved nerve was median nerve, and in the lower extremity it was common peroneal nerve (Table 1).

4 out of the 7 articles focused on the acute management of peripheral neuropathy in burn patients. Acute or early debridement, escharotomy, fasciotomy and nerve decompression were performed in these cases to prevent the compartment syndrome, or to ameliorate the nerve compression symptoms. 2 of the 4 articles studied the acute decompression effect on the involved nerves in the upper extremities and found that 26 out of the 33 decompressed nerves (78.79%)

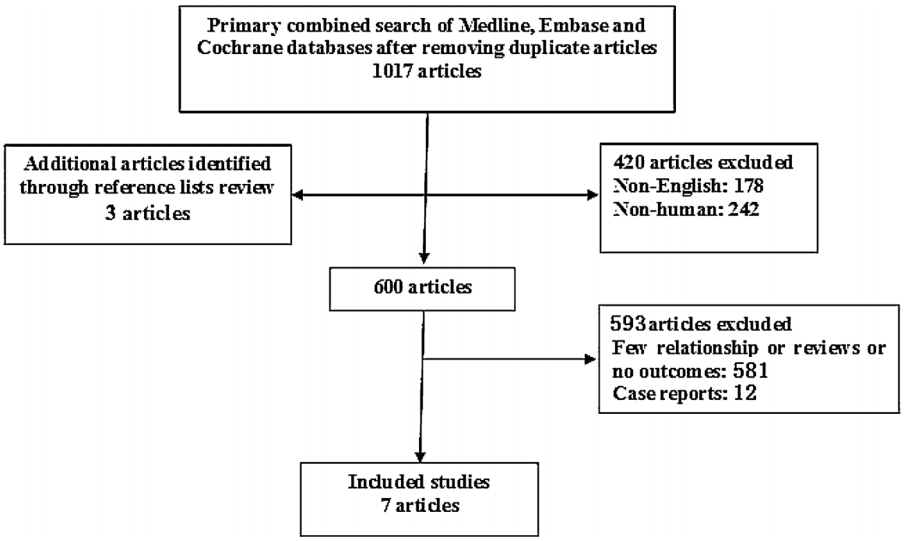

Fig. 1 – Flowchart of the identification and selection of the studies included in the analysis.

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